Name _Key_____ AP Chemistry

Gas Laws Practice

1) (a) $\frac{265\ torr}{1} x \frac{1\ atm}{760\ torr} = 0.348\ atm$

   (b) $\frac{265\ torr}{1} x \frac{760\ mm\ Hg}{760\ torr} = 265\ mm\ Hg$

   (c) $\frac{265\ torr}{1} x \frac{101.325\ Pa}{760\ torr} = 35.33\ Pa$

2) $V_1 = 35.0\ L; T_1 = 20.0℃ = 293\ K; T_2 = 45.0℃ = 318\ K$

$$V_2 = \frac{V_1 T_2}{T_1} = \frac{(35.0\ L)(318\ K)}{293\ K} = 38.0\ L$$

3) $V_1 = 25\ L; T_1 = 1200℃ = 1473\ K; T_2 = 250℃ = 523\ K$

$$V_2 = \frac{V_1 T_2}{T_1} = \frac{(25\ L)(523\ K)}{1473\ K} = 8.9\ L$$

4) $P_1 = 1.00\ atm;\ V_1 = 4.50\ L;\ T_1 = 20.0℃ = 293\ K;\ P_2 = 0.600\ atm;\ T_2 = -20.0℃ = 253\ K$

$$V_2 = \frac{P_1 V_1 T_2}{P_2 T_1} = \frac{(1.00\ atm)(4.50\ L)(253\ K)}{(0.600\ atm)(293\ K)} = 6.5\ L$$

5) $V_1 = 6.0\ L;\ P_1 = 1.0\ atm;\ V_2 = 3.5\ L$

$$P_2 = \frac{V_1 P_1}{V_2} = \frac{(6.0\ L)(1.0\ atm)}{3.5\ L} = 1.7\ atm$$

6) $P_1 = 1.00\ atm;\ V_1 = 42500\ L;\ T_1 = 15.0℃ = 288\ K;\ P_2 = 175\ atm;\ T_2 = 3.00℃ = 276\ K$

$$V_2 = \frac{P_1 V_1 T_2}{P_2 T_1} = \frac{(1.00\ atm)(42500\ L)(276\ K)}{(175\ atm)(288\ K)} = 0.85\ L$$

7) $n_{oxygen} = 5.0\ mol;\ n_{nitrogen} = 3.0\ mol; V = 30.0\ L; T = 25℃ = 298\ K; R = 0.0821\ L \cdot atm/K \cdot mol$

$$P_{oxygen} = \frac{nRT}{V} = \frac{(5.0\ mol)\left(0.0821\ {}^{L \cdot atm}/_{K \cdot mol}\right)(298K)}{30.0\ L} = 4.1\ atm$$

$$P_{nitrogen} = \frac{nRT}{V} = \frac{(3.0\ mol)\left(0.0821\ {}^{L \cdot atm}/_{K \cdot mol}\right)(298K)}{30.0\ L} = 2.4\ atm$$

$$P_T = 4.1\ atm + 2.4\ atm = 6.5\ atm$$

8) $P_1 = 0.70\ atm;\ P_2 = 1.25\ atm$

$$P_T = 0.70\ atm + 1.25\ atm = 1.95\ atm$$

9) $V = 2.0\ L; n = 3.5\ mol; T = 1350℃ = 1623\ K; R = 0.0821\ L \cdot atm/K \cdot mol$

$$P = \frac{nRT}{V} = \frac{(3.5\ mol)\left(0.0821\ {}^{Latm}/_{Kmol}\right)(1623\ K)}{2.0\ L} = 233\ atm$$

The canister would explode because the pressure is greater than 210 atmospheres.

10) $V = 35\ L; T = 315\ K; P = 190\ atm; R = 0.0821\ {}^{Latm}/_{Kmol}$

$$n = \frac{PV}{RT} = \frac{(190\ atm)(35\ L)}{\left(0.0821\ {}^{Latm}/_{Kmol}\right)(315\ K)} = 257\ mol$$